

***REMARKS*****Cancellation of Claims**

Claims 10-17, 21-22, and 25 are canceled without prejudice, waiver, or disclaimer. Applicant takes this action merely to reduce the number of disputed issues and to facilitate early allowance and issuance of other claims in the present application. The canceled claims include non-elected claims 10-17, as requested by the Examiner. Applicant reserves the right to pursue the subject matter of these canceled claims in a continuing or divisional application, if Applicant so chooses, and does not intend to dedicate any of the canceled subject matter to the public.

**Response To Objections/Rejections****Response To Objections To Specification**

Minor objections were made to the specification, all of which are corrected herein. Applicant respectfully requests that the objections to the specification be withdrawn in view of the above corrections.

**Response To Objections To Drawings**

Fig. 2 and Fig. 3 have been “objected to ... insofar as the words are blurry, and an insufficiently wide left margin is provided.” *Office Action* at 3. Fig. 4 was “objected to for inconsistencies in noting the run number...”, for in the abbreviation to be amended to “conc.” and for amendment of the phrase “Mol/mol K<sup>4</sup>.<sup>4</sup>” *Id.* Appropriate correction has been made to each of the figures enclosed herewith. Applicant respectfully requests that the drawing amendments be approved and the objections to the drawings be withdrawn.

Response To Claim Rejections Under 35 U.S.C. §112, First Paragraph

The specification was “objected to under 35 U.S.C. §112, first paragraph insofar as ‘Na K<sub>2</sub>SO<sub>4</sub>’ cannot be understood.” *Office Action* at 3-4. Applicant has amended the sentence herein to more clearly indicate that the objected-to phrase means a K<sub>2</sub>SO<sub>4</sub> solution with a high Na content. Applicant respectfully requests that the objection be withdrawn in view of this amendment.

Response To Claim Rejections Under 35 U.S.C. §112, Second Paragraph

The specification was “rejected to under 35 U.S.C. §112, first paragraph, for failing to particularly point out and distinctly claim the subject matter for which patent protection is sought. At issue is the scope of the term ‘colloidal silica.’” *Office Action* at 4. The Examiner has cited language related to colloidal silica from page 1 of the “Background” section of Applicant’s specification. As noted in that quoted language, “colloidal silica is a suspension of very small, spherical particles of amorphous (not crystalline) silica suspended in water.” *Specification* at 1, ll. 8-9. This definition is supported by definitions commonly found in chemical dictionaries, such as, for example, Hawley’s Condensed Chemical Dictionary, 13 ed., 1997, which defines “colloid chemistry” in part as “the study of … matter when one or more of its dimensions lie in the range between 1 millimicron (nanometer) and 1 micron [1,000 nanometers].... In this size range, … the particles do not settle out of the suspension by gravity and are small enough to pass through filter membranes.” Hawley’s at pp. 288-9. A copy of the relevant pages are attached hereto as “Exhibit A.”

The additional feature of the particle size recited later in the same paragraph of the instant specification that was cited in the Office Action is merely an example of colloidal silica particle size. Indeed, the specification states, “[t]he silica particles generally range in size ....” *Id.* at ll. 10-11. Further, this characteristic of exemplary particle size is found in the “Background” section of the specification and generally refers to colloidal silica of the prior art, and is not intended to limit the present invention. Thus, Applicant submits that the specification points out and distinctly claims the subject matter for which patent protection is sought, and respectfully requests that the rejection of this term as used in the claims be withdrawn.

In addition, Applicant has amended the portion of the specification quoted in the Office Action as follows: "The silica particles generally range in size from about 8 nanometers to a maximum size of about 80 500 nanometers, ...." The amendment does not constitute new matter, as support for this range may be found in the cited reference U.S. Patent No. 5,352,277 to Sasaki, as well as in the above-referenced chemical dictionary.

Claim 5 was rejected, and has been amended herein by adding the phrase --an aqueous suspension of-- as suggested by the Examiner. Applicant has claimed a range of particle sizes, however, of 8 nanometers to 300 nanometers. As noted above, the maximum particle size of 80 nanometers stated in Applicant's specification refers to what generally occurs in the prior art, not to the presently claimed invention. Support for the claimed particle range in claim 5 can be found in the specification at least at page 7, lines 22-25.

Claim 18 was rejected, and has been amended herein by deleting the term "stream" and replacing it with the term --solution--. Applicant submits that this overcomes the rejection to claim 18.

Claim 22 was rejected, and has been canceled herein, thus rendering moot the rejection of this claim.

Applicant wishes to clarify that the foregoing amendments have been made for purposes of better defining the invention in response to the rejections made under 35 U.S.C. § 112, and not in response to the rejections made based on prior art. Indeed, Applicant submits that no substantive limitations have been added to the claims by the amendments made in response to these rejections. Therefore, no prosecution history estoppel arises from these amendments.

*Black & Decker, Inc. v. Hoover Service Center*, 886 F.2d 1285, 1294 n. 13 (Fed. Cir. 1989); *Andrew Corp. v. Gabriel Electronics, Inc.*, 847 F.2d 819 (Fed. Cir. 1988); *Hi-Life Products Inc. v. American National Water-Mattress Corp.*, 842 F.2d 323, 325 (Fed. Cir. 1988); *Mannesmann Demag Corp. v. Engineered Metal Products Co., Inc.*, 793 F.2d 1279, 1284-1285 (Fed. Cir. 1986); *Moeller v. Ionetechs, Inc.*, 794 F.2d 653 (Fed. Cir. 1986).

#### Response To Claim Rejections Under 35 U.S.C. §103

(a) Claims 1-9 and 18-25 have been rejected under 35 U.S.C. §103(a) as allegedly being "obvious over the ZACSIL® E200 brochure or applicants' admission, further in view of USP

6334880 to Negrych, USP 5458812 to Brekau, and USP 5352277 to Sasaki and/or USP 3969266 to Iler." *Office Action* at 9. Applicant respectfully traverses this rejection.

In order for a claim to be properly rejected under 35 U.S.C. §103, the teachings of the prior art reference must suggest all features of the claimed invention to one of ordinary skill in the art. *See, e.g., In re Dow Chemical*, 837 F.2d 469, 5 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1988); *In re Keller*, 642 F.2d 413, 208 U.S.P.Q. 871, 881 (C.C.P.A. 1981). Additionally, “[o]bviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. Under section 103, teachings of references can be combined only if there is some suggestion or incentive to do so.” *ACS Hospital Systems, Inc., v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984).

Here, there is no suggestion or incentive to combine the cited references, either in the references themselves or to knowledge generally available to one of ordinary skill in the art. A combination of the cited references would not produce the claimed colloidal silica with high purity. The Examiner notes that *Brekau* describes an ultrafiltration process which accomplishes the "obvious advantage of reduced transportation and storage costs". Applicant maintains its contention that *Brekau* only discloses concentrating the colloidal silica; however, Claims 1-9 and 18-25 use the ultrafiltration process to remove sodium from the colloidal silica by washing the colloidal silica with water. The process described in *Brekau* does not disclose washing the colloidal silica with discrete amounts of water and requires the continuous flow of an alkaline soda waterglass solution. Additionally, because *Brekau* does not teach or suggest washing the colloidal silica with water, it also does not teach adding a hydroxide base during the wash step to maintain the desired pH and cation concentration, as claimed in amended claim 1. *Brekau* therefore does not teach the removal of excess sodium from the colloidal silica and does not teach or make obvious the claimed invention. The Office Action fails to show how the process of *Brekau* renders obvious claim 1, even when combined with other references.

Further, the newly-cited *Sasaki* reference does not cure this deficiency of *Brekau*. Claim 1, as amended, claims the step of adding a hydroxide base to the colloidal silica to maintain a desired pH and cation concentration during the claimed process. Applicant has discovered that as water is added in the process to wash the colloidal silica, the pH of the system drops.

Applicant compensates for this by adding a hydroxide base to the colloidal silica in order to maintain the pH at alkaline levels and cation concentration, which is not taught or suggested by the cited references, even in combination. Thus, claim 1 is believed to be allowable over the cited references. For at least this reason, its dependent claims 2-9 are also allowable as a matter of law.

Additionally, claim 18 as amended states in part:

subjecting said quantity of high purity potassium salt solution to electrodialysis and/or electrolysis to produce a high purity solution of potassium hydroxide; and

adding a portion of said high purity potassium hydroxide solution while washing said quantity of colloidal silica to produce a high purity CMP slurry of colloidal silica.

These claimed steps, in combination with the steps previously claimed in claim 18, are not taught or suggested by the combined references. For at least this reason, its dependent claims 19-21 and 23-24 are also allowable as a matter of law.

(b) The Examiner also rejects Claims 1-9 and 18-25 "under 35 U.S.C 103(a) as being obvious over WO 99/01377 to *Kempro* in view of either [U.S. Patent No, 2,244,325 to] *Bird* or *Iler* '134, in view of USP 5352277 to *Sasaki* and/or USP 3969266 to *Iler*." *Office Action* at 11. Applicant further maintains that the processes described in *Kempro*, *Bird*, and *Iler* '134 do not disclose washing the colloidal silica in order to decrease the sodium content. The ultrafiltration described in *Kempro* is designed instead to simply concentrate the colloidal silica.

As noted previously, *Sasaki* does not cure the deficiencies of the other references because it does not teach or suggest washing the colloidal silica while adding a hydroxide base in order to maintain the pH and the cation concentration. Thus, *Sasaki* does not cure the deficiencies of *Kempro* and *Bird* or *Iler* '134. Similarly *Iler* '266 also does not teach or suggest adding a hydroxide base to the colloidal silica in its process. Therefore, the combination of references does not teach or even suggest independent claim 1.

Similarly, the Office Action also fails to meet the requirements for a 35 U.S.C, 103(a) rejection for claims 18-25 because the Examiner does not cite any art that relates to separation of

the potassium hydroxide solution. The Office rejects Claims 18-25 by asserting that “it would have been obvious to have regenerated the ion exchange resin and have recovered the potassium ion.” *Office Action* at 11. The Office Action, however, does not cite any relevant art to show that Claims 18-25 are obvious, or any motivation in the art to modify any reference to render the claimed steps obvious. The Board of Patent Appeals and Interferences’ rejection of a need for any specific hint or suggestion in the art to combine references was recently held to be legal error. *In re Lee*, 277 F.3d 1338 (Fed. Cir. 2002). Moreover, the Office “cannot rely on conclusory statements when dealing with particular combinations of prior art and specific claims, but must set forth the rationale on which it relies.” *Id.* at 1345. Further, the court stated that the specific teaching that would have suggested the claimed combination must be present, and subjective belief could not be relied on to support the combination of references. The Office Action does not show that there was a suggestion or motivation to combine references, an expectation of success, or that the prior art teaches or suggests all of the claim limitations. Applicant, therefore, respectfully requests that the rejections of claims 18-21 and 23-24 be withdrawn.

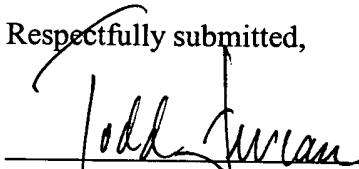
Prior Art Made of Record

The prior art made of record has been considered, but is not believed to affect the patentability of the presently pending claims.

**CONCLUSION**

In light of the foregoing amendments and for at least the reasons set forth above, Applicant respectfully submits that all objections and/or rejections have been traversed, rendered moot, and/or accommodated, and that the now pending claims 1-9, 18-20, and 23-24 are in condition for allowance. Favorable reconsideration and allowance of the present application and all pending claims are hereby respectfully requested. If, in the opinion of the Examiner, a telephone conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (770) 933-9500.

Respectfully submitted,

  
\_\_\_\_\_  
**Todd Deveau**

Registration No.: 29,526

**THOMAS, KAYDEN,  
HORSTEMEYER & RISLEY, L.L.P.**  
Suite 1750  
100 Galleria Parkway N.W.  
Atlanta, Georgia 30339  
(770) 933-9500

EXHIBIT

A

*Hawley's*  
**CONDENSED  
CHEMICAL  
DICTIONARY**

Richard J. Lewis, Sr.

Thirteenth Edition

This text is printed on acid-free paper. ©

Copyright © 1997 by John Wiley & Sons, Inc.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, scanning or otherwise, except as permitted under Sections 107 or 108 of the 1976 United States Copyright Act, without either the prior written permission of the Publisher, or authorization through payment of the appropriate per-copy fee to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, (978) 750-8400, fax (978) 750-4744. Requests to the Publisher for permission should be addressed to the Permissions Department, John Wiley & Sons, Inc., 605 Third Avenue, New York, NY 10158-0012, (212) 850-6011, fax (212) 850-6008, E-mail: PERMREQ@WILEY.COM.

**Library of Congress Cataloging-in-Publication Data**

Condensed chemical dictionary.

Hawley's condensed chemical dictionary.—13th ed./revised by  
Richard J. Lewis, Sr.

p. cm.

ISBN 0-471-29205-2 (hardcover)

I. Chemistry-Dictionaries. I. Hawley, Gessner Goodrich, 1905-1983.  
II. Lewis, Richard J., Sr. III. Title.

QD5.C5 1997

540'.3—dc21

97-35762

CIP

Printed in the United States of America

10 9 8 7 6 5 4 3

in water, alcohol, and chloroform. Solutions are levorotatory.

**Derivation:** From *Colchicum autumnale* by extraction and subsequent crystallization. Has been synthesized.

**Grade:** Technical, USP.

**Hazard:** As little as 20 mg may be fatal if ingested.

**Use:** To induce chromosome doubling in plants; phytopathology.

**colcothar.** Red ferric oxide produced by heating ferrous sulfate in air.

**Use:** Pigment; abrasive in polishing glass.

**cold flow.** The permanent deformation of a material that occurs as a result of prolonged compression or extension at or near room temperature. Some plastics and vulcanized rubber exhibit this behavior. In metals it is known as creep.

**cold light.** See bioluminescence.

**cold rubber.** Synthetic rubber produced by polymerization at relatively low temperature, specifically SBR or butadiene-styrene elastomers produced by polymerization at approximately 4.4°C rather than the usual temperature of approximately 49°C. A special catalyst system is required.

**cold-short.** See short.

**colemanite.**  $(Ca_2B_6O_{11} \cdot 5H_2O)$ . The ore of calcium borate. Used to replace boric acid in the manufacture of glass fibers. Mined in Turkey, it began to be imported into the U.S. in large volume in 1965 and is competitive with domestically produced  $B_2O_3$ .

**Properties:** D 2.26–2.48.

**Derivation:** From kernite.

**colestipol.** An anion exchange resin, highly cross-linked and insoluble. A specific formula has not been ascertained. Said to be a copolymer of diethylene triamine and chloroepoxypropane. It is used as a cholesterol-sequesering agent in medicine.

**colistin.**  $C_{45}H_{85}N_{13}O_{10}$ . Antibiotic produced by a soil microorganism. Probably identical to polymyxin E and closely related chemically to polymyxin B since it is a polypeptide composed of amino acids and a fatty acid.

See polymyxin.

**collagen.** A fibrous protein constituting most of the white fiber in the connective tissues of animals and humans, especially in the skin, muscles, and tendons. The most abundant protein in the animal kingdom, it is rich in proline and hydroxyproline. The molecule is analogous to a three-strand rope, in which each strand is a polypeptide chain. It has a molecular weight of approximately 100,000. Glue

made from the collagen of animal hides and skins is still widely used as an adhesive. So-called "soluble" collagen is that first formed in the skin; upon aging it becomes increasingly cross-linked and less hygroscopic. Soluble collagen is used in the cosmetic industry as the basis for face creams, lotions, and hair preparations. Special forms of collagen have been developed for dialysis membranes. Microcrystalline collagen is used in prosthetic devices and other medical and surgical applications. Regenerated collagen, used in sausage casings, is made by neutralizing with acid collagen that has been purified by alkaline treatment. Collagen is converted to gelatin by boiling water, which causes hydrolytic cleavage of the protein to a mixture of degradation products.

See gelatin.

**collection trap.** Cooled container that collects gas-chromatographic eluant, preserving the eluant for the compound-identification step.

**2,4,6-collidine.** (2,4,6-trimethylpyridine).  
 $(CH_3)_3C_6H_2N$ .

**Properties:** Colorless liquid. Bp 170.4°C, fp -44.5°C, d 0.913 (20/20°C), refr index 1.4981 (20°C). Soluble in alcohol; slightly soluble in water. Combustible.

**Grade:** Technical, (97.5% purity).

**Use:** Chemical intermediate, dehydrohalogenating agent.

**colligative property.** A property independent of the chemical nature of the molecules of a substance, resulting only from the number of molecules present.

**collodion.** A solution of pyroxylin (nitrocellulose) in ether and alcohol. USP specifications are pyroxylin 40 g, ether 750 ml, and alcohol 250 ml.

**Properties:** Pale-yellow, syrupy liquid; odor of ether. Immiscible with water; flash p approximately 0°F (-17.7°C).

**Grade:** Technical, USP.

**Hazard:** Flammable, dangerous fire risk.

**Use:** Cements, coating wounds and abrasions, solvent for drugs, corn removers, process engraving, lithography, photography.

See nitrocellulose.

**colloidal solution.** A system intermediate between a true solution and a suspension. A dispersion where the particle size is between 1 and 100 nm. Colloids have little or no tendency to dialyze and small or no freezing-point depression.

**colloid, association.** See association.

**colloid chemistry.** A subdivision of physical chemistry comprising the study of phenomena characteristic of matter when one or more of its dimensions lie in the range between 1 millimicron

; and skins called "sol-skin; uponed and less in the cosms, lotions, of collagen branes. Metric devices ons. Regen-gs, is made has been pu- is converted s hydrolytic degradation

hat collects g the eluant

line).

fp -44.5C, 0C). Soluble Combustible.

halogenating

independent of of a substance, molecules pres-

nitrocellulose) ons are pyro- 250 ml. uid; odor of approximately

isk. abrasions, sol- less engraving,

termediate be- sion. A disper- een 1 and 100 ency to dialyze ession.

tion.

on of physical of phenomena or more of its n 1 millimicron

(nanometer) and 1 micron (micrometer). It thus includes not only finely divided particles but also films, fibers, foams, pores, and surface irregularities. Dimension, rather than the nature of the material, is characteristic. Colloidal particles may be gaseous, liquid, or solid, and occur in various types of suspensions (imprecisely called solutions), e.g., solid-gas (aerosol), solid-solid, liquid-liquid (emulsion), gas-liquid (foam). In this size range, the surface area of the particle is large with respect to its volume so that unusual phenomena occur, e.g., the particles do not settle out of the suspension by gravity and are small enough to pass through filter membranes. Macromolecules (proteins and other high polymers) are at the lower limit of this range; the upper limit is usually taken to be the point at which the particles can be resolved in an optical microscope. The first specific observations were made by Thomas Graham in approximately 1860 and were extended by Ostwald, Hatchek, and Freundlich. Though the term is often used synonymously with *surface chemistry*, in a strict sense it is limited to the size range noted in at least one dimension, whereas surface chemistry is not. Natural colloid systems include rubber latex, milk, blood, egg white, etc.

See *surface chemistry*; *colloid*, *protective*; *emulsion*.

**colloid mill.** See *homogenization*.

**colloid, protective.** A hydrophilic high polymer whose particles (molecules) are of colloidal size, such as protein or gum. It may be either naturally present in such systems as milk and rubber latex or intentionally added to mixes to stop coagulation or coalescence of the particles of fat or other dispersed material. Protective colloids are also called stabilizing, suspending, or thickening agents; they also act as emulsifiers. Examples are (1) hydrocarbon particles of latex, which are covered with a layer of protein that keeps them from cohering as a result of the impact due to their Brownian motion; (2) gelatin, sodium alginate, or gum arabic, which are added to ice cream to inhibit formation of ice particles and to confectionery and other food products to obtain a smooth, creamy texture. They are readily adsorbed by the suspended particles and reinforce the protective effect of proteins that may be naturally present.

See *thickening agent*; *gum, natural*; *gelatin*.

**"Colloisol" [BASF].** TM for a series of vat dyes for dyeing and printing textiles of cellulosic fibers.

**cologne.** (toilet water). A scented, alcohol-based liquid used as a perfume, after-shave lotion, or deodorant. Combustible.

**Cologne brown.** See *Van Dyke brown*.

**colophony.** A rosin residue that remains after the volatiles have been removed by distillation of crude turpentine from any of the *Pinus* species.

**colorant.** Any substance that imparts color to another material or mixture. Colorants are either dyes or pigments and may be (1) naturally present in a material (chlorophyll in vegetation), (2) admixed with it mechanically (dry pigments in paints), or (3) applied to it in a solution (organic dyes to fibers).

**Note:** There is no generally accepted distinction between dyes and pigments. Some have proposed one on the basis of solubility or physical form and method of application. Most pigments, so called, are insoluble inorganic powders, the coloring effect being a result of their dispersion in a solid or liquid medium. Most dyes, on the other hand, are soluble synthetic organic products that are chemically bound to and actually become part of the applied material. Organic dyes are usually brighter and more varied than pigments but tend to be less stable to heat, sunlight, and chemical effects. The term *colorant* applies to black and white, as well as to actual colors. Instruments for measuring, comparing, and matching the hue, tone, and depth of colors are called colorimeters.

See *dye*; *pigment*; *colorimetry*; *food color*; *FD&C color*.

**"Colorex" [Stauffer].** TM for titanium trichloride in aqueous solution with zinc chloride. Dark-violet to black liquid.

**Use:** Powerful reducing agent, dye stripper for textiles.

**colorimeter.** An analytical device used to measure the comparative intensity of color in solutions by comparison with standard solutions.

See *photoelectric colorimeter*.

**colorimetric analysis.** Analysis based on the law that intensity of color of certain solutions is proportional to the amount of substance in the solution.

**colorimetric purity.** The ratio of luminance of spectrally pure light that must be mixed with reference achromatic (white) light to produce a color match for the specimen.

**colorimetry.** An analytical method based on measuring the color intensity of a substance or a colored derivative of it. For example, the yellow-carotene content of butter is determined by saponifying a sample of butter in an alkaline solution, extracting the carotene with ether, and measuring the intensity of yellow color in the ether extract. Colorimetric methods are used to determine very minute amounts. They are used in hospital laboratories for blood and urine analysis; in food laboratories for determination of vitamins, preservatives, coloring matter, etc.; and in metallurgical laboratories for traces of metals in raw materials and finished products.

**Color Index.** (C.I.). A listing of all commercial dyes, each of which has an individual number that identifies it on specifications.